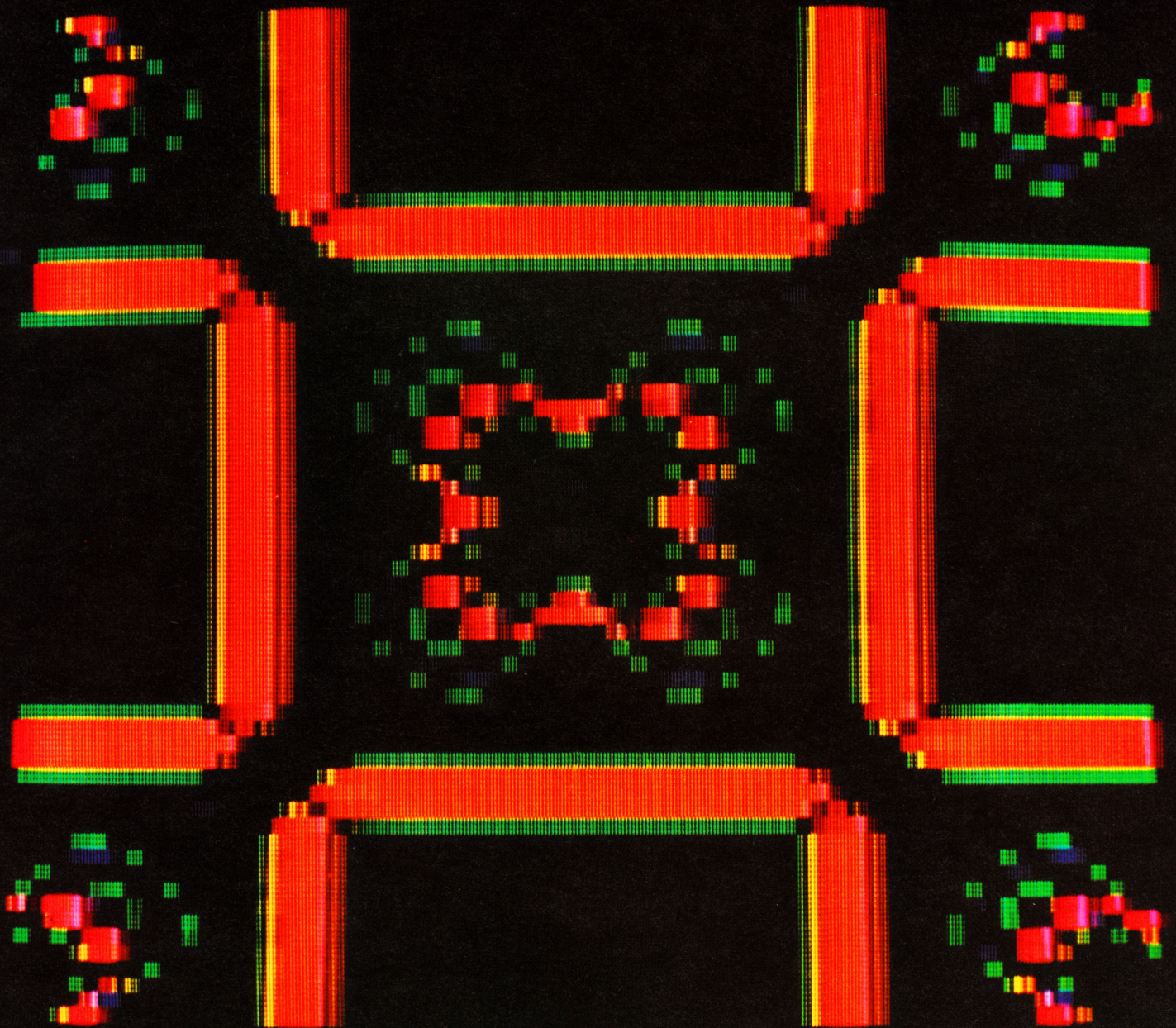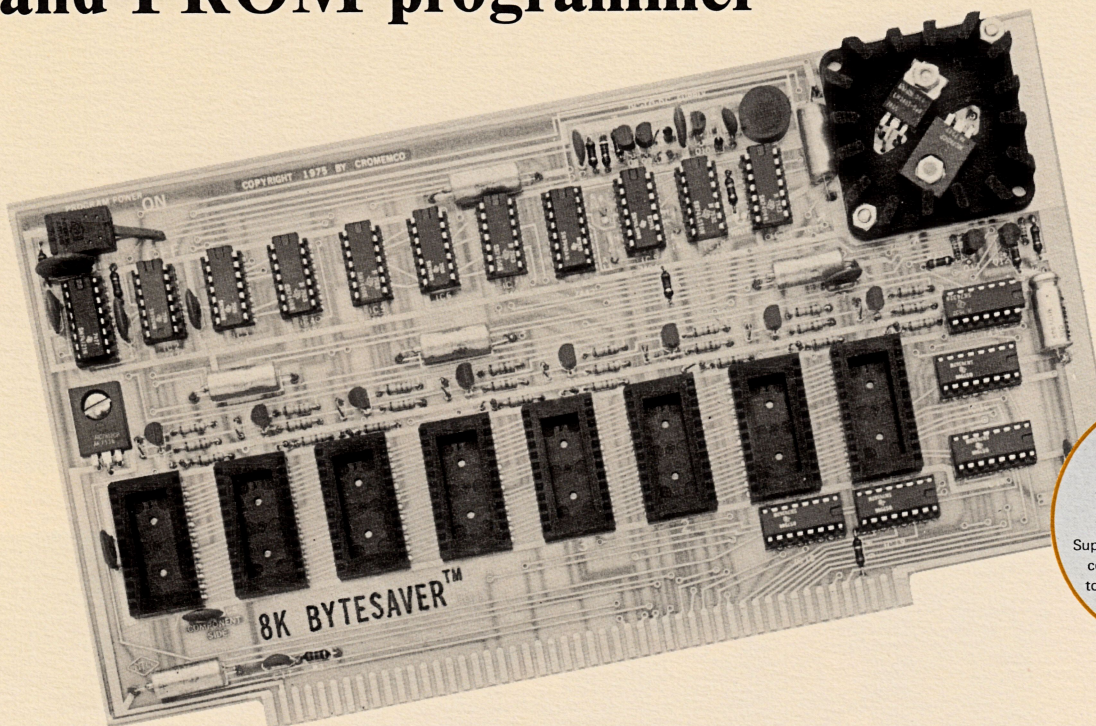# Cromemco

Specialists in computer peripherals

Advanced peripherals for your microcomputer

Cromemco

BYTESAVER memory board and PROM programmer

Supplied with one 2704 PROM containing special software to transfer RAM content to PROM and PROM to RAM.

Cromemco's popular BYTESAVER™ memory board gives you two of the most-wanted features in microcomputer work:

(1) a simple, easy way to store your computer programs in programmable read only memory (PROM).

(2) a PROM memory board with the capacity for a full 8K bytes of PROM memory storage.

ECONOMICAL

The BYTESAVER™ is both a place and a way to store programs economically. It transfers programs from the non-permanent computer RAM memory to the permanent PROM memory in the BYTESAVER™. Once your program is in the BYTE-SAVER™, it's protected from power turn-offs, intentional or accidental. The PROMs used with BYTESAVER™ are UV erasable and can be used again and again.

The BYTESAVER™ itself plugs directly into your Altair 8800 or IMSAI 8080.

PROM PROGRAMMER

Many people are surprised to learn that in the BYTESAVER™ you also have your own PROM programmer. But it's so. And it saves you up to hundreds of dollars, since you no longer need to buy one separately.

The built-in programmer is designed for the 2704 and 2708 PROMs. The 2708 holds 1K bytes, four times the capacity of the well-known older 1702 PROM (yet cost-per-byte is about the same). The 2708 is also fast — it lets your computer work at its speed without a wait state. And it's low-powered. With 2708's in all 8 sockets, the BYTESAVER™ is still within MITS bus specifications, drawing only about 500 mA from the +8V bus. A complement of 2708 PROMs gives the BYTESAVER™ its full 8K capacity.

HOLDS LARGE PROGRAMS

The BYTESAVER's™ 8K-byte capacity lets you store the larger and more powerful programs. 8K BASIC, for example, easily fits in the BYTESAVER™ capacity of 8 PROMs. One 1K PROM will hold many games such as Cromemco's DAZZLER-LIFE or DAZZLE-WRITER.

NO KEYBOARD NEEDED

The BYTESAVER™ comes with special software programmed into a 2704 PROM. This software controls transfer of the computer RAM content to the BYTESAVER™ PROM.

So you are ready to go. You don't even need a keyboard. Just set the computer sense switches as instructed in the BYTESAVER™ documentation.

Transfer of memory content to PROM ("burning") takes less than a minute. The BYTESAVER™ software controls computer lights to verify complete and accurate transfer of memory content.

The software also programs any of the other 7 PROM positions in the BYTESAVER™ as readily as the first.

And when used to transfer information from the BYTESAVER™ PROMs to RAM, the special design of the software allows loading a large program such as 8K BASIC in one second.

AVAILABLE NOW — STORE/MAIL

BYTESAVER™ kit $195
(Model 8KBS-K)
BYTESAVER™ assembled $295
(Model 8KBS-W)
BYTESAVER™ also available with one software-programmed 2708 PROM (instead of 2704) @ $220 (kit) or $320 (assembled). BYTESAVER with no PROMs is $145 (kit) or $245 (assembled). Additional 2704 is $50; additional 2708 is $75.

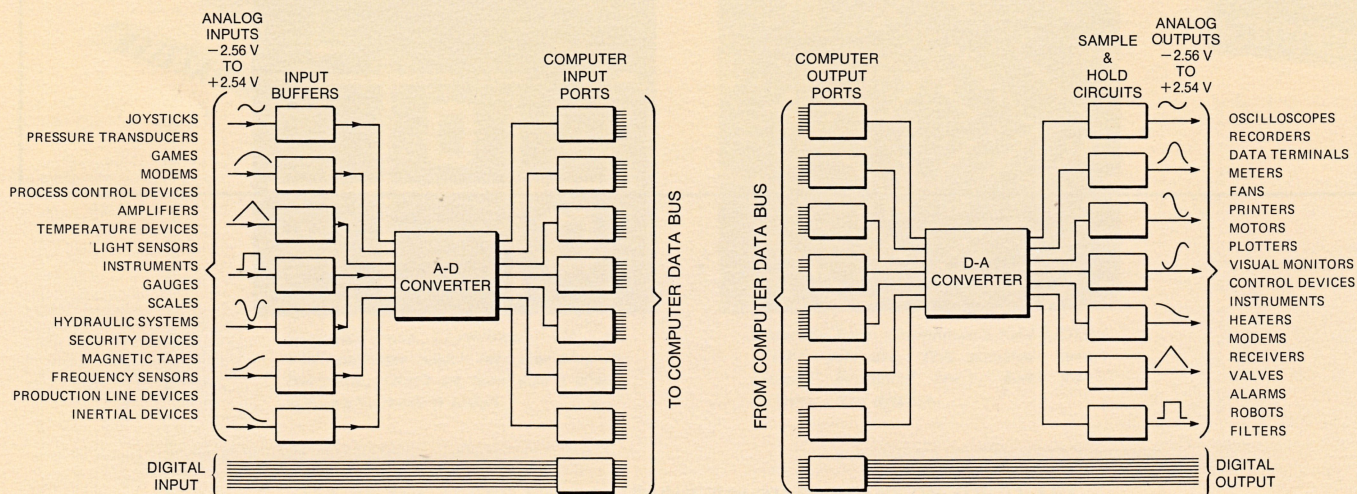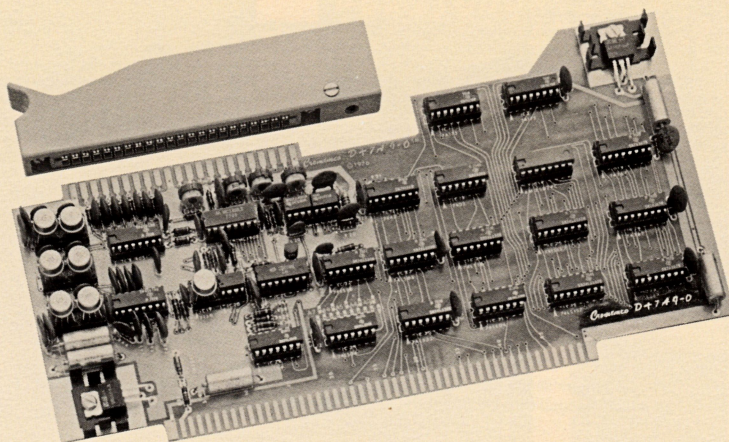*See "ordering info" on back cover.*

Cromemco

D+7AI/O™ Multi-channel microcomputer analog interface

Now you have a way to get analog information into and out of your microcomputer. It's an easy, fast, and unbelievably inexpensive way.

It's Cromemco's new D+7A™ high-performance I/O module which gives you:

- 7 channels of 8-bit analog-to-digital conversion (to input analog data to the computer)
- 7 channels of digital-to-analog conversion (to output computer data in analog form)
- an 8-bit parallel I/O port to input and output data in digital form.
- a fast conversion time of 5.5 microseconds.

A MULTITUDE OF USES

The D+7A makes it easy to use your computer for the jobs you want it to do—such as process control, digital filtering, games, oscilloscope graphics, speech recognition, speech and music synthesis.

The D+7A lets you input and output analog data with all sorts of devices: joysticks, ham radio gear, measurement instruments, machine tools, transducers, control systems, motors, recorders, and plotters, to name just a few.

NO FURTHER SOFTWARE NEEDED

The D+7A I/O plugs directly into the Altair 8800 or IMSAI 8080 microcomputers. Analog signal range is from −2.56 to +2.54 volts (20-millivolt increments) on both input and output sides.

Simple "Input" and "Output" instructions initiate A/D conversion and read in or out the ensuing 8 bits of data. No further software is required. During conversion the D+7A holds down the computer "Ready" line.

Addresses of the input and output ports are jumper-wire selectable in blocks of 8. Sample-and-hold circuitry is used to "latch" the analog outputs.

LOW-PRICED

The low price of the D+7A is a result of Cromemco's design leadership. The D+7A and all Cromemco peripherals are of advanced computer-grade quality. The D+7A is solder-masked and printed with full legend for easy, error-free assembly.
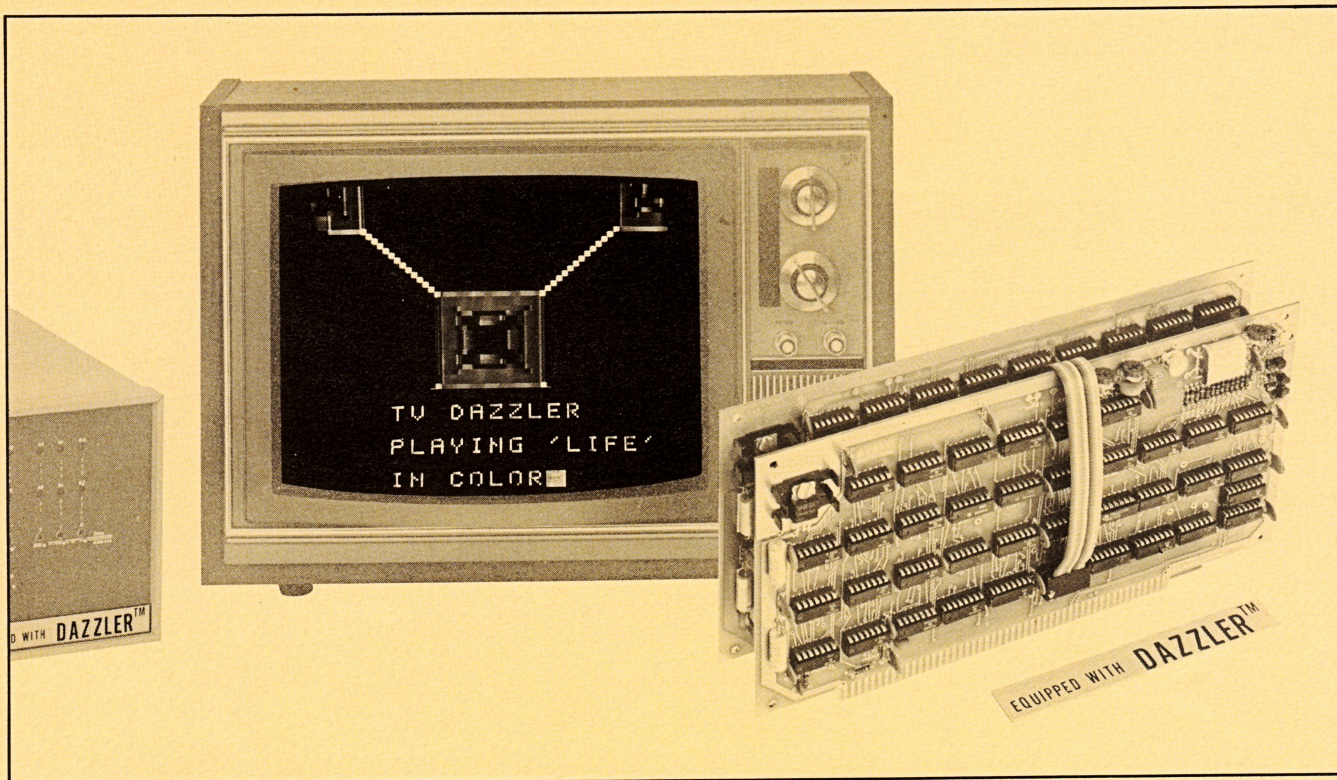
AT COMPUTER STORES/MAIL

You can get the D+7A at computer stores in either kit or assembled form.

Or order directly by mail from Cromemco. Delivery is from stock to 30 days. The D+7A is certain to be popular so order now.

D+7A™ I/O kit $145
D+7A™ I/O assembled $245

Each D+7A includes a connector to connect to the 8 input and 8 output ports.

Photo: TV showing "TV DAZZLER PLAYING 'LIFE' IN COLOR" and a circuit board labeled "EQUIPPED WITH DAZZLER™"

TV Dazzler ™

**. . . a microcomputer interface
that lets a color TV
be your computer display terminal**

- **inexpensive**
- **unbelievably versatile**
- **beautiful displays**
  of computer games

- **for hobbyists**
- **for engineers**
- **for educators**
- **for business**

Cromemco's new computer/tv interface circuit lets you have a full-color computer display terminal for little more than a black-and-white terminal.

The Cromemco interface also lets you do vastly more with your color terminal than you can do with ordinary black-and-whites.

We call our interface the TV Dazzler™. It consists of two circuit boards that plug directly into your Altair 8800 or IMSAI 8080 computer.

ALPHANUMERICS PLUS ACTION, AND GRAPHICS

The Dazzler™ maps your computer memory content onto your color tv screen in full color.

That doesn't mean just that you see alphanumerics in color. You can display *any* information in memory. And do so in color.
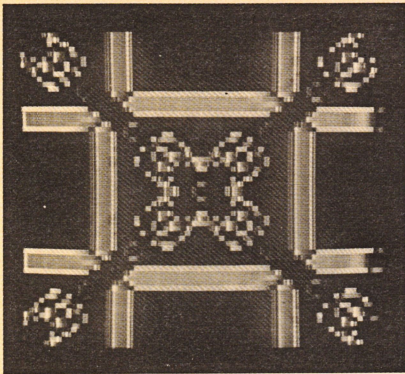
NEEDS ONLY 2K MEMORY

Technically, the Dazzler™ scans your computer memory using direct-memory access (DMA). It formats each memory bit into a point on the tv screen to give a 128 x 128-element picture. Only a 2K-byte computer memory is required (only 512 bytes for a 32 x 32 picture). The quality of the pictures is evident in the photos.

The Dazzler™ output is a video signal that goes directly to the tv video amp or to the antenna terminal through an inexpensive commercially-available device.
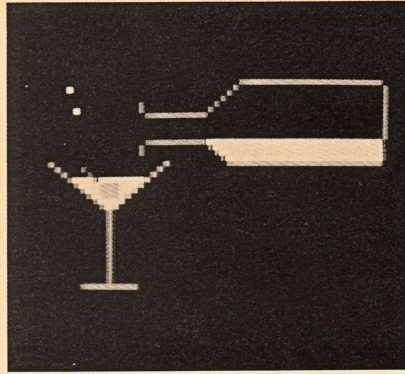
INEXPENSIVE — AND SO MUCH BETTER

You can see from the list below that the Dazzler™ is little if any more in price than an ordinary b/w interface or tv typewriter. But it does much more.
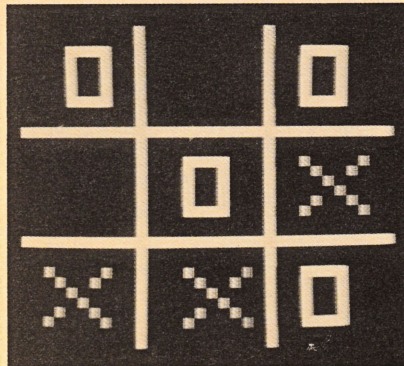
TV display pattern obtained during a sequence of the computer game LIFE from Cromemco software (below). Display is in beautiful color (see cover).
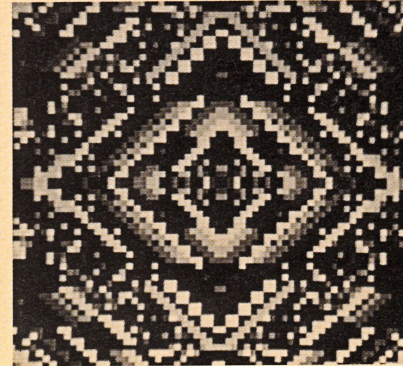

An example using Cromemco's DAZZLE-MATION software. A second tape ("Magenta Martini") was used to obtain above action display. This tape is included with DAZZLE-MATION as a use example.

Top four lines show range and style of alphanumerics obtainable with Cromemco's DAZZLE-WRITER software. Query lines are first two prompts from MITS BASIC.

Sequence from Cromemco's TIC-TAC-TOE software which lets you play the computer. Don't be sure you'll always win—we've made it rough.

Sequence from Cromemco's KALEIDO-SCOPE software. This program runs without keyboard entry, gives you stunning color display.

ALL OF THE ABOVE ARE BEAUTIFUL COLOR DISPLAYS ON THE TV SET

DISPLAYS IN COLOR

You can display computer games or animated shows (rocket ships). What's more, you can display business or technical graphics — multi-colored charts, graphs, histograms, educational material — all from computer memory. Even light shows. Not even the biggest computer manufacturers offer all this in color.

ORDER NOW
BY MAIL OR AT YOUR COMPUTER STORE

If you're into computer (or want to be), if you want to invent these beautiful displays or games, or to plot colorful material inexpensively at home or in business, the Dazzler™ is for you.

Not only is it reasonable, but it's sold at computer stores from coast to coast.

Or order directly by mail on your bank card.

TV DAZZLER™ (complete kit) $215
TV DAZZLER™ (fully assembled
and tested) $350

SOFTWARE
(punched paper tape with documentation)

LIFE in full color $15
KALEIDOSCOPE in full color $15
DAZZLE-WRITER (for
alphanumeric displays in color) $15
DAZZLE-MATION (for computer-
generated animated displays $15
TIC-TAC-TOE (you play
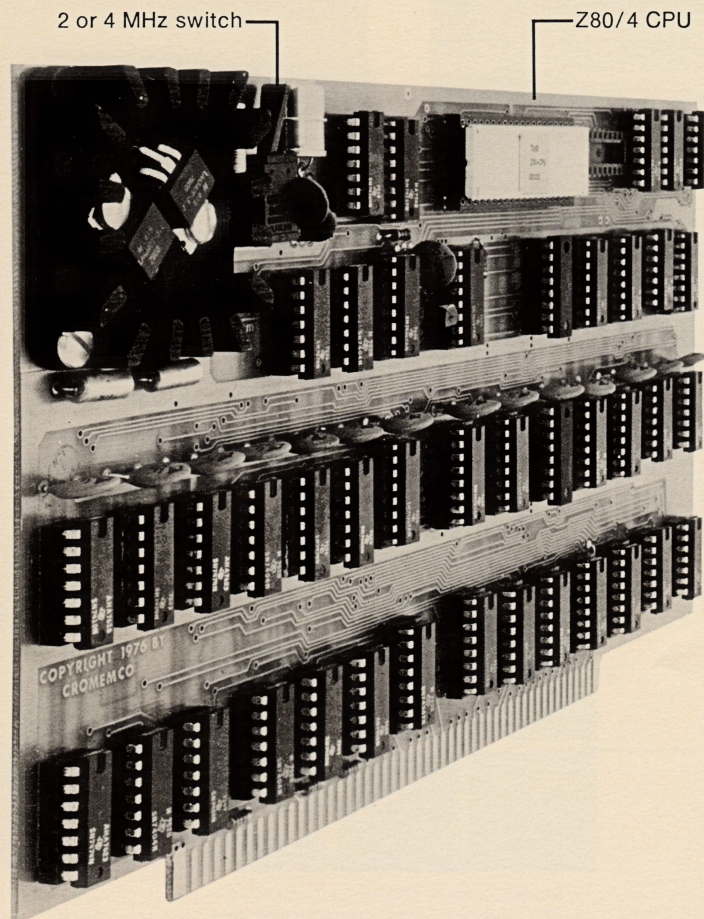the computer) $15

See "ordering info" on back cover.

Cromemco

4 MHz CPU card

Available Nov. '76

2 or 4 MHz switch — Z80/4 CPU

COPYRIGHT 1976 BY CROMEMCO

2–5X MORE THROUGHPUT

Here is by far the most powerful CPU card now available.

It's Cromemco's new ZPU™ card.

It uses the slick new Z-80 chip—in fact, it uses the even faster Z80/4 high speed version of the Z-80—and it's the *only* card that does. The Z80/4 is certified by its manufacturer for 4 MHz operation.

The Z80/4 has all the advantages of the 8080 and 6800—and enormously more.

And Cromemco's new ZPU does enormously more.

4 MHz CLOCK RATE

First, the ZPU lets you choose either a 2 or 4 MHz crystal-controlled clock rate. Right away that means you can have twice the throughput. Cuts program running time in half. Then the instruction set of the Z80/4 reduces software even more.

The 2 or 4 MHz clock rate is switch-selectable as shown in the above photo.

POWER-ON MEMORY JUMPS

Cromemco's ZPU also has some neat design innovations of its own.

For example, you'll like the simplified operation you get because upon power turn-on the ZPU will jump to any desired 4K boundary in memory. No switch flipping to go through to begin your program.

SELECTABLE WAIT STATES

Cromemco engineers have also arranged that your present systems will always be useful with the new ZPU. To do this, the ZPU has been designed to have jumper-wire-selectable wait states on the card.

These simplify interfacing with your present memory or I/O even at 4 MHz operation.

80 ADDITIONAL INSTRUCTIONS

You've probably heard that the Z-80 with its 80 new additional instructions is by far the most powerful chip around. It's true.

That means with the ZPU you will be able to devise much more powerful (as well as faster) software than before.

ALTAIR/IMSAI COMPATIBLE WITHOUT MODIFICATION

Yes, the new ZPU is plug-compatible with the Altair 8800 and IMSAI 8080. Just remove the existing CPU, plug in the ZPU card, and you're up and running.

Further, the Cromemco ZPU is the only card guaranteed to work with all present and future Cromemco peripherals. (Cromemco manufactures the popular BYTESAVER™ memory, the TV DAZZLER™, the D + 7A™ analog interface board, a joystick console, and others.

INCLUDES FREE SOFTWARE

The ZPU comes with our powerful Z-80 monitor, complete documentation, source code, and paper tape object code. The monitor is also available in PROM ($75) for use in our BYTESAVER memory board.

STORE/MAIL

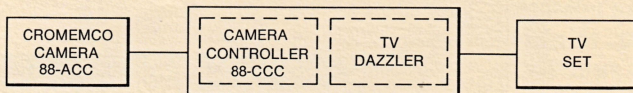The new ZPU is available as a kit or assembled. Look into it now because you can see demand will be strong.

ZPU kit (Model ZPU-K) $295
ZPU assembled
(Model ZPU-W) $395

Cromemco

Low Cost
Optical Data Digitizer

- **for hobby work**
- **for security work**
- **for night viewing**
- **for pattern recognition**
- **for automated control systems**
- **for special-design projects**


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┌──────────┐   ┌──────────┐ ┌──────────┐      ┌──────────┐
│CROMEMCO  │   │ CAMERA   │ │   TV     │      │    TV    │
│CAMERA    │───│CONTROLLER│ │ DAZZLER  │──────│   SET    │
│88-ACC    │   │  88-CCC  │ │          │      │          │
└──────────┘   └──────────┘ └──────────┘      └──────────┘
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The Cromemco 88-ACC is an inexpensive general-purpose digital TV camera that can be used with the Altair 8800 or IMSAI 8080 computers. Signals from the camera are stored in the computer memory. Thus, by suitably programming the computer you have a wide range of possible uses for the camera-computer combination that are totally beyond the usual computer applications (see list above).
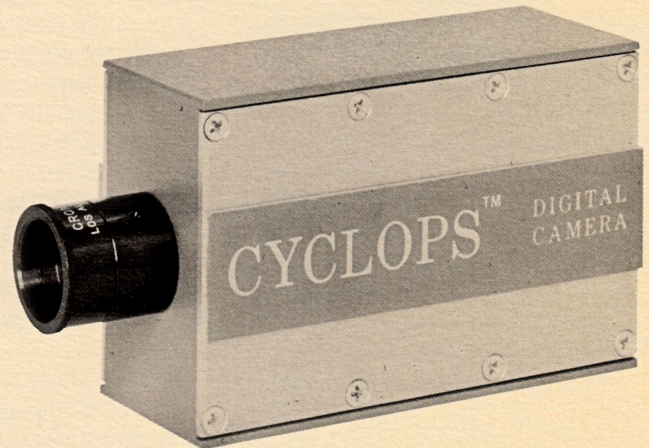
(If you then connect a TV Dazzler tm (pp 4-5) and an ordinary home TV set to your computer, you can see on your TV what the camera sees. The camera signal can be reformatted by the computer for the TV set with suitable software.)

USES IMAGE SENSOR

The camera uses an image sensor rather than the customary expensive vidicon tube. This sensor permits Cyclops tm to be much simpler (and much less costly) than the regular TV cameras. Yet it provides a 32-element x 32-element picture that can be used for many purposes such as surveillance or pattern recognition.

Cyclops tm is provided with a digital differential output so that you can connect it to virtually any digital circuitry.

All connections to the Cyclops tm 88-ACC camera are made to a connector on the camera rear. All necessary voltages and signals are provided by the 88-CCC interface accessory which plugs into the Altair 8800 or IMSAI 8080 computer.

SMALL AND LIGHT

The 88-ACC camera is pleasingly compact. Overall dimensions are only 4-1/2" x 2-3/4" x 1-3/4". The case is extruded aluminum finished in blue baked enamel.

The camera is equipped with a medium-fast f2.8 25-mm lens that is suited to general work.

For night viewing, the camera would require infrared light on the viewed scene.

AVAILABLE NOW

Cyclops tm Digital Camera kit
(Model 88-ACC-K) $195
Cyclops tm Digital Camera assembled
(Model 88-ACC-W) $295

CYCLOPS tm CAMERA CONTROLLER

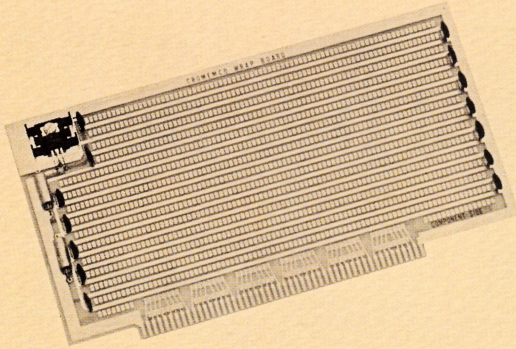This Cromemco circuit interfaces the Cyclops tm camera to the Altair 8800 or IMSAI 8800 computer. The 88-CCC Controller consists of two circuit boards that plug directly into the computers. The 88-CCC then supplies all needed signals and power for the Cyclops tm camera.

Using the Cyclops tm controller permits software control of exposure, frame rate, and memory allocations for picture storage. Direct Memory access (DMA) is used to store the picture in the computer memory.

Cyclops tm Camera Controller kit
(Model 88-CCC-K) $195
Cyclops tm Camera Controller assembled
(Model 88-CCC-W) $295

Wire Wrap Board

A high-quality wire wrap board for building your own cards for the Altair 8800 or IMSAI 8080 computers. Will hold over 70 integrated circuits. A 5-volt power supply is included on the board. Uses tantalum decoupling capacitors and disc ceramic bypass capacitors. Edge contacts are gold-plated for long, trouble-free life.
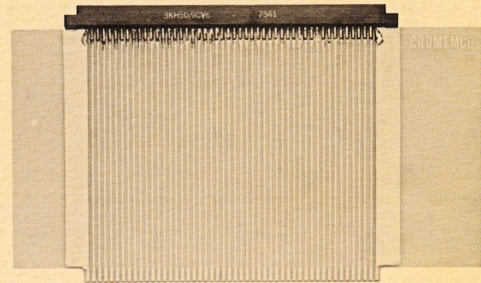
- Wire Wrap Board kit (Model WWB-2K) $35
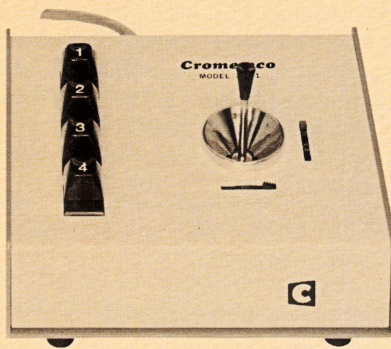- Wire Wrap Board assembled (Model WWB-2W). . $45

Extender Card

The card you need when experimenting with or trouble-shooting the Altair 8800 or IMSAI 8080 computers. Extends computer boards above case for easy connection of voltmeter, logic probe, or oscilloscope. Compatible with all Altair/IMSAI boards. Edge contacts are gold plated for long, trouble-free life.

Connector is included (photo).

- Extender Card kit (Model EXC-2K) $35
- Extender Card assembled (Model EXC-2W) . . . $45

Joystick console with speaker

This is not merely a joystick but a console with 4 pushbutton switches and a built-in speaker with speaker amplifier. Can be used for games, interactive graphics, cursor positioning, process control.

With this console you can also have an audio output— adds dramatic effect to the fun of games and gives another dimension in other applications.

Use with D + 7A analog I/O shown on p. 3. Two consoles use only about half of the channels of the D + 7A I/O.

- Joystick Console Kit (Model JS-1K) $65
- Joystick Console Assembled (Model JS-1W) $95

Ordering information

Cromemco's advanced peripherals are sold at computer stores from coast to coast.
Or you can order directly by mail from Cromemco. Cromemco ships promptly — most of the time from stock.

- Mastercharge and BankAmericard are accepted with signed order. Please show complete card number and expiration date.

- Mail orders are shipped prepaid if fully paid with order.
- Purchase orders accepted subject to credit approval.
- Shipments to outside U.S. — Payment must accompany order and must include a 10% surcharge to cover additional shipping and handling charges.
- California users add 6% sales tax.

Prices at stores may be slightly higher to cover stocking costs.

Cromemco
Specialists in computer peripherals
2432 Charleston Rd., Mountain View, CA 94043 ● (415) 964-7400